CLAIMS

1. An antislip regulation and an antilock braking system for a vehicle equipped with a braking system comprising one or more brake cylinders (100, 200, 300, 400) each associated with one or more wheels, a source of fluid under pressure (10), and a brake control (14) adapted to be operated to effect braking by feeding said cylinders with fluid under pressure via one or more brake valves and one or more brake pipes (44, 46),

which system is characterized in that it includes a function selector (50; 150) adapted to adopt an antislip mode position (50A; 150A) in which it connects a branch pipe (52; 152, 153) to a fluid feed pipe (54) and an antilock mode position (50B; 150B) in which it connects a branch pipe (52; 152, 153) to a return line (56), a control valve (110, 210, 310, 410; 510, 610, 710, 810) for the brake cylinder or each brake cylinder (100, 200, 300, 400) adapted to adopt a normal braking position (100A, 210A, 310A, 410A; 510A, 610A, 710A, 810A) in which it connects the cylinder to the brake pipe (44, 46) and one or more special mode positions (110B, 210B, 310B, 410B; 510B, 510C; 610B, 610C; 710B, 710C; 810B, 810C) in which it connects the cylinder to a branch pipe (52; 152, 153) connected either to the return line or to the fluid feed pipe, according to the position of the function selector, and means (120, 220, 320, 420, UC) for detecting wheelspin or a wheel tending to lock and for commanding in consequence thereof at least the control valve associated with the brake cylinder associated with that wheel, and in that the control valve (110, 210, 310, 410, 510, 610, 710, 810) of the brake cylinder or of each brake cylinder is a progressive valve such that, when the function selector (50; 150) is in its antislip mode position, operation of the control valve modulates a braking force to control wheelspin and, when the function selector (50; 150) is in its antilock mode position, operation of the control valve modulates the releasing of

the braking of a wheel.

2. A system according to claim 1, characterized in that the function selector (50) comprises a feed channel (51A) connected to the fluid feed pipe (54), a return channel (51B), and an outlet channel (51C) connected to the branch pipe (52), in that the control valve (110, 210, 310, 410) for each brake cylinder comprises a channel (111A) connected to the cylinder, a channel (111B) connected to the brake pipe (44, 46), and a channel (111C) connected to the branch pipe (52), and in that, in the antilock mode position (50B) of the selector (50), the return channel (51B) and the outlet channel (51C) are connected together and the feed channel (51A) is isolated from them, in the antislip mode position (50A) of the selector (50), the feed channel (51A) and the outlet channel (51C) are connected together and the return channel (51B) is isolated from them, in the normal braking position (110A, 210A, 310A, 410) of the control valve (110, 210, 310, 410), the channel (111A) connected to the cylinder and the channel (111B) connected to the brake pipe (44, 46) are connected together and the channel connected (111C) to the branch pipe (52) is isolated from them, and, in the special mode position (110B) of the control valve (1110, 210, 310, 410), the channel (111A) connected to the cylinder (100, 200, 300, 400) and the channel (111C) connected to the branch pipe are connected together and the channel (111B) connected to the brake pipe (44, 46) is isolated from them.

3. A system according to claim 1, characterized in that the function selector (150) comprises a feed channel (151A) connected to the fluid feed pipe (54), a return channel (151B), a first outlet channel (151C) connected to a first branch pipe (152), and a second outlet channel (151B) connected to a second branch pipe (153), in that the control valve (510, 610, 710, 810) for each brake

cylinder (100, 200, 300, 400) is adapted to adopt two special mode positions (510B, 510C; 610B, 610C; 710B, 710C; 810B, 810C), respectively an antilock mode position and an antislip mode position, and comprises a channel (511A) connected to the cylinder, a channel (511B) connected to the brake pipe, a channel (511C) connected to the first branch pipe, and a channel (511B) connected to the second branch pipe, and in that, in the antilock mode position (150B) of the selector (150), the return channel (151B) and the first outlet channel (151C) are connected together and the feed channel (151A) is isolated from them, in the antislip mode position (150A) of the selector (150), the feed channel (151A) and the second outlet channel (151D) are connected together and the return channel (151B) is isolated from them, and, in the normal braking position (510A, 610A, 710A, 810A) of the control valve (510, 610, 710, 810), the channel (511A) connected to the cylinder and the channel (511B) connected to the brake pipe (44) are connected together and the channels connected (511C, 511D) to the first and second branch pipes (152, 153) are isolated from them and from each other, in the antilock mode position (510B) of the control valve, the channel (511A) connected to the cylinder and the channel (511C) connected to the first branch pipe are connected together and the channel (511B) connected to the brake pipe and the channel (511D) connected to the second branch pipe are isolated from them, and, in the antislip mode position (510C) of said valve, the channel (511A) connected to the cylinder and the channel (511D) connected to the second branch pipe are connected together and the channel (511B) connected to the brake pipe and the channel (511C) connected to the first branch pipe (152) are isolated from them and from each other.

4. A system according to claim 3, characterized in that, in the antilock mode position (150B) of the function

selector (150), the second outlet channel (151D) is connected to the return channel (151B) and, in the antislip mode position (150A) of the selector (150), the first outlet channel (151C) is connected to the return channel (151B).

5. A system according to any one of claims 1 to 4, characterized in that the control valve (510, 610, 710, 810) for each brake cylinder includes double-acting pressure reducer means for adjusting the fluid pressure in the cylinder as a function of the operation of said valve.

6. A system according to any one of claims 3 to 5, characterized in that the control valve (510, 610, 710, 810) for each brake cylinder (100, 200, 300, 400) passes through its antilock mode position (510B, 610B, 710B, 810B) on moving between its normal braking position (510A, 610A, 710A, 810A) and its antislip mode position.

7. A system according to any one of claims 1 to 6, characterized in that the antilock mode position (50B; 150B) of the function selector (50; 150) is an unoperated position of said selector towards which it is urged at all times, whereas it must be operated to move it from that position to its antislip mode position (50A; 150A).

8. A system according to any one of claims 1 to 7, characterized in that the normal braking position (111A) of the control valve (110, 210, 310, 410; 510, 610, 710, 810) for each brake cylinder (100, 200, 300, 400) is an unoperated position of that valve towards which it is urged at all times, whereas it must be operated to move it from that position to its special mode position(s).

9. A system according to any one of claims 1 to 8, characterized in that it includes one or more brake fluid

accumulators (20, 22) adapted to be supplied by the source (10) of fluid under pressure and one or more brake valves (16, 18) adapted to be operated to connect the brake pipe (44, 46) to said accumulator.

10. A system according to any one of claims 1 to 9, characterized in that it includes an antislip fluid accumulator (58) adapted to be supplied by the source (10) of fluid under pressure and to be connected to said fluid feed pipe (54) of the function selector (50; 150).

11. A system according to any one of claims 1 to 10, characterized in that the fluid pressure in the fluid feed pipe (54) of the function selector (50; 150) is lower than the pressure at which fluid is fed to the brake pipe (44, 46).

12. A system according to claims 10 and 11, characterized in that the antislip fluid accumulator (58) is connected to the fluid feed pipe (54) via a pressure reducer (60).

13. A system according to any one of claims 1 to 12, characterized in that it comprises means (120, 220, 320, 420) for sensing the speed of each of said wheels, means (UC) for determining a target speed for each wheel, and means for comparing the sensed speed to said target speed and deducing therefrom the existence of wheelspin or of a wheel tending to lock.

14. A system according to claim 13, characterized in that it comprises a control unit (UC) adapted, if wheelspin or a wheel tending to lock is deduced, to move the control valves (110, 210, 310, 410; 510, 610, 710, 810) between their normal braking position (110A, 210A, 310A, 410; 510A, 610A, 710A, 810A) and their special mode position (110B, 210B, 310B, 410B; 510B, 510C; 610B, 610C; 710B, 710C; 810B, 810C) as a function of the speeds of the

wheels and their target speeds.

15. A system according to any one of claims 1 to 14, characterized in that the function selector (50; 150) is adapted to be moved between its antilock mode position (50B; 150B) and its antislip mode position (50A, 150A) manually.

16. A system according to claim 14, characterized in that the control unit (UC) is adapted to move the function selector (50; 150) between its antilock mode position (50B; 150B) and its antislip mode position (50A, 150A) as a function of the speeds of the wheels and a target speed.

17. A system according to claims 15 and 16, characterized in that the control unit (UC) is adapted to move the function selector (50; 150) between its antilock mode position (50B; 150B) and its antislip mode position (50A, 150A) as a function of the speeds of the wheels and their target speeds for as long as said target speeds remain below a particular threshold value, whereas the function selector is adapted to be moved only manually from its antilock mode position to its antislip mode position if the target speeds exceed said threshold value.

18. An antislip and an antilock control valve for one or more wheels of a vehicle, characterized in that it has a first channel (511A) connected to a brake cylinder, a second channel (511B) connected to a braking pressure source, a third channel (511C) connected to a pressure relief pipe, and a fourth channel (511D) connected to an antislip pressure source, in that said control valve is a progressive valve that includes a member (520) mobile between a normal braking position (510A) in which the first and second channels (511A, 511B) are connected together and isolated from the third and fourth channels

(511C, 511D), an antilock mode position in which the first and third channels (511A, 511C) are connected together and isolated from the second and fourth channels (511B, 511D), and an antislip mode position in which the first and fourth channels (511A, 511D) are connected together and isolated from the second and third channels (511B, 511C), and in that it includes means (521A, 521B, 534, 536) for varying the communication area between the first and fourth channels (511A, 511D) in the antislip mode position as a function of the pressure in the first channel (511A) and for varying the communication area between the first and third channels (511A, 511C) in the antilock mode position as a function of the pressure in the first channel (511A).

19. A valve according to claim 18, characterized in that it includes means (521A, 521B) for establishing communication between the first and third channels (511A, 511C) when communication between the first and fourth channels (511A, 511D) is shut off from the antislip mode position and for establishing communication between the first and second channels (511A, 511B) when communication between the first and third channels (511A, 511C) is shut off from the antilock mode position.

20. A valve according to claim 18 or claim 19, characterized in that it includes an actuator (530) adapted to move the mobile member (520) in a first direction (F1) against a return force, in that when the mobile member (520) is moved in said first direction (F1) from its antislip mode position the communication area between the first and fourth channels (511A, 511D) increases, and when said mobile member (520) is moved in said first direction (F1) from its antilock mode position, the communication area between the first and third channels (511A, 511C) decreases, and in that it includes a return control chamber (534) adapted to be

connected in said antislip mode and antilock mode positions to the first channel (511A) of the valve so that the pressure in said chamber depends on the pressure in said first channel, the return control chamber having a mobile wall (534A) delimited by a surface of the mobile member and facing in the first direction (F1) and a fixed wall (536A) facing the mobile wall, so that an increase in pressure in that chamber moves the mobile member in the direction opposite the first direction.

21. A valve according to claim 20, characterized in that there exists an intermediate antislip situation in which, when the mobile member (520) is moved in the first direction (F1), communication is established between the first and fourth channels (511A, 511D), whereas, when the mobile member is moved in the opposite direction (F2), communication is established between the first and third channels (511A, 511C), and in that there exists an intermediate antilock situation in which, when the mobile member (520) is moved in said first direction (F1), communication is established between the first and third channels (511A, 511C), whereas, when the mobile member is moved in the opposite direction (F2), communication is established between the first and second channels (511A, 511B).

22. A valve according to claim 20 or claim 21, characterized in that the mobile member (520) is mobile in translation in a bore (522) comprising in succession in the first direction (F1) a braking orifice (522B) connected to the second channel (511B), a first orifice connected to the brake cylinder (522A) connected to the first channel (511A), an antislip orifice (522D) connected to the fourth channel (511D), a pressure relief orifice (522C) connected to the third channel (511C), and a second orifice connected to the brake cylinder (522A') connected to the first channel (511A), in that the mobile

member (520) has a first groove (521A) adapted to connect the first orifice connected to the brake cylinder (522A) either to the brake orifice (522B) or to the antislip orifice (522D) according to the position of the mobile member (522), and a second groove (521B) adapted either to connect the pressure relief orifice (522C) to the second orifice connected to the brace cylinder (522A') or to isolate those two orifices from each other, according to the position of the mobile member.

23. A valve according to claim 22, characterized in that the second groove (521B) connects the return control chamber (534) to the second orifice (522A') connected to the brake cylinder in the antislip mode and antilock mode positions.

24. A valve according to claim 23, characterized in that the mobile member (520) has a transverse bore (526) that communicates with said second groove (521B) and delimits said mobile wall (534A) of the return control chamber.

25. Valve according to claim 24, characterized in that the return control chamber (534) is delimited on the side opposite said mobile wall (534A) by the end (536A) of a needle (536) disposed in a longitudinal bore (527) of the mobile member (520) connected to the transverse bore (526).